

JC07 Rec'd PCT/PTO 22 FEB 2002

FORM PTO-1390 (REV 10-2000)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	ATTORNEY'S DOCKET NUMBER 34691/243031
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371			U.S. APPLICATION NO. (If known, see 37 C.F.R. 1.5) 10/069140
INTERNATIONAL APPLICATION NO. PCT/DE00/00911	INTERNATIONAL FILING DATE March 24, 2000	PRIORITY DATE CLAIMED August 22, 1999	
TITLE OF INVENTION LIGHT SOURCE			
APPLICANT(S) FOR DO/EO/US Jorg Arnold			
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information.			
<p>1. <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371</p> <p>2. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371.</p> <p>3. <input checked="" type="checkbox"/> This is an express request to promptly begin national examination procedures (35 U.S.C. 371(f)).</p> <p>4. <input type="checkbox"/> The US has been elected by the expiration of 19 months from the priority date (PCT Article 31)</p> <p>5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2))</p> <p>a. <input type="checkbox"/> is attached hereto (required only if not communicated by the International Bureau).</p> <p>b. <input checked="" type="checkbox"/> has been communicated by the International Bureau.</p> <p>c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US)</p> <p>6. <input checked="" type="checkbox"/> A English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).</p> <p>7. <input type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))</p> <p>a. <input type="checkbox"/> are attached hereto (required only if not communicated by the International Bureau)</p> <p>b. <input type="checkbox"/> have been communicated by the International Bureau.</p> <p>c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired.</p> <p>d. <input type="checkbox"/> have not been made and will not be made</p> <p>8. <input type="checkbox"/> An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3))</p> <p>9. <input checked="" type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).</p> <p>10. <input type="checkbox"/> An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).</p> <p>Items 11. To 16. Below concern other document(s) or information included:</p> <p>11. <input checked="" type="checkbox"/> An Information Disclosure Statement under 37 C.F.R. 1.97 and 1.98.</p> <p>12. <input type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included</p> <p>13. <input checked="" type="checkbox"/> A FIRST preliminary amendment <input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment</p> <p>14. <input type="checkbox"/> A substitute specification.</p> <p>15. <input type="checkbox"/> A change of power of attorney and/or address letter.</p> <p>16. <input checked="" type="checkbox"/> Other items or information: 2 sheets of drawings 4 prior art documents</p>			

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U.S. APPLICATION NO. 10/069140 <small>(U.S. Patent, sec 37 CFR 1.53)</small>	INTERNATIONAL APPLICATION NO PCT/DE00/00911	ATTORNEY'S DOCKET NUMBER 34691/243031
17. <input checked="" type="checkbox"/> The following fees are submitted.		CALCULATIONS PTO USE ONLY
Basic National Fee (37 CFR 1.492(a)(1)-(5)): Neither international preliminary examination fee (37 CFR 1.482) nor International search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO \$1,040.00		
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO \$ 890.00		
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search (37 CFR 1.445(a)(2)) paid to USPTO \$ 740.00		
International preliminary examination fee (37 CFR 1.482) paid to USPTO But all claims did not satisfy provisions of PCT Article 33(1)-(4) \$ 710.00		
International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) \$ 100.00		
ENTER APPROPRIATE BASIC FEE AMOUNT =		\$ 890.00
Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).		\$
CLAIMS	NUMBER FILED	NUMBER EXTRA
Total Claims	5 - 20 =	0
Independent Claims	2 - 3 =	0
MULTIPLE DEPENDENT CLAIM(S) (if applicable)		+ \$280.00
TOTAL OF ABOVE CALCULATIONS =		\$ 890.00
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by one-half.		\$
SUBTOTAL =		\$ 890.00
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).		\$
TOTAL NATIONAL FEE =		\$ 890.00
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property +		\$
TOTAL FEES ENCLOSED =		\$ 890.00
		Amount to be Refunded \$
		Charged \$
a. <input checked="" type="checkbox"/> A check in the amount of \$ 890.00 to cover the above fees is enclosed. b. <input type="checkbox"/> Please charge my Deposit Account No. 16-0605 in the amount of \$ to cover the above fees. A duplicate copy of this sheet is enclosed c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 16-0605		
Note: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137 (a) or (b)) must be filed and granted to restore the application to pending status.		
SEND ALL CORRESPONDENCE TO: Charles B. Elderkin <i>Charles B. Elderkin</i> SIGNATURE REGISTRATION NUMBER 24,357 ALSTON & BIRD LLP Bank of America Plaza 101 South Tryon Street, Suite 4000 Charlotte, NC 28280-4000 Tel Charlotte Office (704) 444-1000 Fax Charlotte Office (704) 444-1111 Customer Number 00826		"Express Mail" Mailing Label Number EL 910299045 US Date of Deposit February 22, 2002 I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to BOX PCT, Attn DO/US (PTO) Commissioner for Patents, Washington, DC 20231. <i>Joyce D. Smith</i> Joyce D. Smith

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IN THE UNITED STATES DESIGNATED OFFICE (DO/US)

In re: Arnold Attn: DO/US
International Appl. No.: PCT/DE00/00911
International Filing Date: March 24, 2000
For: LIGHT SOURCE

February 22, 2002

Box PCT
Commissioner for Patents
Washington, DC 20231

PRELIMINARY AMENDMENT

Sir:

Kindly amend the above identified application as follows:

In the Claims

Cancel Claims 6-24, without prejudice.

In re: Arnold
Inter'l Appl. No.: PCT/DE00/00911
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REMARKS

The present Amendment serves to remove the multiple dependent claims from the application, and it is requested that the Amendment be entered prior to the calculation of the filing fee.

The applicant expressly reserves the right to subsequently submit new claims directed to the subject matter of the presently cancelled claims.

Respectfully submitted,



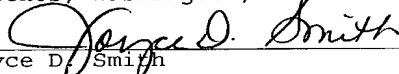
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Joyce D. Smith

LIGHT SOURCE

The invention relates to a light source, in particular incandescent lamp, with a bulb, a filament arranged in the bulb, and a heating device for the filament, the filament emitting both visible light and heat radiation.

Light sources of the described type have been known from practice for a long time, and they exist in a large variety of designs and sizes. In this connection, for example, incandescent lamps are known as electrical light sources, in which it is common to bring a tungsten filament by electrical Joule heat to a highest possible temperature. In this process, a temperature radiation is generated. The light yield of incandescent filaments considerably increases as the temperature rises. Besides that, also so-called nonthermal sources of radiation are known, for example, discharge lamps, such as inert gas-, mercury-, sodium-, and metal halide discharge lamps in high-pressure and low-pressure designs.

All so far known, electrically operated types of light sources have the disadvantage that they are very inefficient with respect to converting electric power into visible light output. The conversion barely exceeds 30%. The largest portion of the consumed electric power is an uneconomical dissipation primarily in the form of heat.

A possibility of increasing the efficiency of known light sources consists in that the heat radiated from the filament or glow wire, is reflected from the inner side of the bulb back to the filament or glow wire. As a result, the filament or glow wire undergoes a kind of backheating. This results in that after reaching the same filament temperature, less electric power will be

needed than during a heating without reflection. The visible light output, which is transmitted through the bulb, remains in this instance the same. In the ideal case, only that electric power will be needed, which
5 corresponds to the visible, emitted light output and to the thermal dissipation, which is absorbed by the bulb. Thus, the conversion efficiency is improved by the portion of the reflected heat radiation. Theoretically, it would be possible to increase with that the conversion
10 efficiency to as much as 75% or 140 lumens/watt, if one took as a basis the standard thermal dissipation of tungsten lamps of about 25%, and if one neglected the radiation absorption of a mirror coating on the inner side of the bulb. In this connection, for example,
15 dielectric mirror coatings have an absorption of typically 0.1%.

In the case of a mirror coating on the inner side of the bulb with a reflecting power of, for example, 99.9%, statistically, every one thousandth photon in the
20 material of the mirror coating will be absorbed. In the case of a reflection of the radiation into the bulb, the photon flux may therefore undergo only 1000 reflections on the inner side of the bulb, until it is totally absorbed in the bulb. The probability that on its path
25 of reflection, the photon flux strikes the filament or glow wire and is there absorbed, is proportionate to the ratio of the filament volume or the filament surface to the reflecting bulb volume or the reflecting bulb surface.

30 To achieve a highest possible backheating of the filament, it will therefore be advantageous, when a large filament surface is present, so that the photon flux strikes the filament and is there absorbed after the

fewest possible reflections on the inner side of the bulb.

However, in this instance, it is disadvantageous that in the case of an enlarged filament surface, the electrical resistance of the filament becomes smaller, so
5 that for reaching the filament temperature necessary for the light emission, a substantially greater current is needed in the filament than in the case of a normal filament surface or normal filament cross section. This
10 may lead to safety problems for the user of the light source. In summary, there is a dilemma as to a largest possible filament surface and the therefor required and disadvantageous high currents.

It is therefore an object of the present invention
15 to describe a light source of the initially described type, which allows to achieve a high conversion efficiency with simple means and in a reliable manner.

The foregoing object is achieved by a light source with the characterizing features of claim 1.
20 Accordingly, the light source is designed and constructed such that the heating device includes a heating element for an indirect heating of the filament.

In accordance with the invention, it has been recognized that the development of a separate heating
25 element for the filament accomplishes the foregoing object in a surprisingly simple manner. In this instance, the filament is indirectly heated by the heating element, which offers the great advantage that the filament may be configured irrespective of its
30 electrical resistance behavior. As a result, it is possible to realize a large-surface filament, which exhibits a high absorptive power for heat radiation, which is reflected from the inner side of the bulb. The device, which is needed for heating the filament may be

realized independently of the configuration of the filament. Consequently, it is also possible to realize a heating device, which operates with electric currents, which can be safely managed. An electrical contact
5 between the heating device and the filament is no longer needed.

Thus, the light source of the present invention denotes a light source, which allows to achieve a high conversion efficiency with simple means and great
10 reliability.

As regards a most favorable possible absorption behavior for heat radiation, it would be possible to design and construct the filament in the form of a strip, or, quite generally, as a flat filament. As an
15 alternative thereto, one could also make the filament, quite generally, as a volume filament, i.e., a filament, which occupies a spatial volume, or comprises a volume. In particular, one could make the filament in the shape of a cup or cylinder jacket. In this connection, a
20 configuration as a complete cylinder jacket or even as a portion thereof, in particular a cylinder jacket half is possible. In the case of a substantially complete cylinder jacket, such a jacket could also be made open on its side or axially slotted. This is favorable with
25 respect to the thermal expansion behavior of the filament.

To guarantee a particularly effective absorption of the heat radiation being reflected from the inner side of the bulb, the diameter of the cylinder jacket, or of a
30 portion or half thereof, could be only slightly smaller than the diameter of the bulb. In particular in this instance, it would be possible to arrange the filament in the bulb in concentric and/or coaxial relationship with a longitudinal axis of the bulb.

Depending on its configuration, the filament could divide the interior of the bulb into one or more half spaces or subspaces.

The bulb could have such a large outer surface that it is possible to dissipate the surface heat, which is generated, for example, by absorption of heat radiation, with the use of convection cooling or any other forced cooling. The size and form of the filament and the bulb could adapted to each other in a corresponding manner.

Basically, the filament could contain tungsten, and/or rhenium, and/or tantalum, and/or zirconium, and/or niobium. In this connection, adjustments are to be made to the respective needs of the light source characteristics. The filament could contain the last-mentioned materials in a sintered form.

Furthermore, the filament could be composed at least in part of a nonmetal. This could improve the mechanical stability of the filament.

With respect to very high surface temperatures, and very high light currents in the visible range, the filament could be composed at least in part of tantalum carbide, and/or rhenium carbide, and/or niobium carbide, and/or zirconium carbide. This would allow to reach surface temperatures, which are higher than is normal for known tungsten filament lamps.

Concretely, the heating element could be an incandescent element that is heated by the electric current. The filament is heated by the heat radiation of the incandescent element. The incandescent element may be adapted to the required lamp output independently of the filament. In a particularly simple manner, the incandescent element could be a heating coil.

As regards a particularly favorable heating of the filament by the incandescent element, the latter could be

arranged within a space or half space formed by the filament, preferably within a cylinder jacket or a cylinder jacket half. In this connection, quasi the largest portion of the heat radiated from the

5 incandescent element is absorbed by the filament. When the filament is designed as a body that is open in sections -- for example, as a cylinder jacket half -- the incandescent element will be able to contribute in addition to the generation of light. In this instance,

10 the incandescent element radiates in the direction, which is predetermined by the configuration of the filament. The light source would be able to emit light already before the filament is heated to the temperature necessary for the light emission. A time delay between

15 the activation of the light source and light emission is thus largely avoided.

In a particularly simple manner, the incandescent element could be formed from tungsten. In this instance, the use of conventional tungsten heating coils is

20 possible.

In a constructionally very simple manner, the filament could be attached to a power supply conductor for the heating element or incandescent element, thereby avoiding additional holding means for the filament in the

25 bulb.

As an alternative or in addition to a heating of the filament by means of a heated incandescent element, one could arrange magnetic inductors in the bulb or outside thereof for an indirect heating of the filament.

30 Likewise with that, an indirect heating of the filament is possible in a simple manner.

To optimize the reflection behavior of the inner side of the bulb, which is transparent for the visible light, the bulb could have a mirror coating on its inner

side. In a particularly favorable manner, same could be a dielectric multilayer coating. With that, a spectrally selective mirror coating is present, which largely reflects the portion of heat radiation and transmits the portion of visible radiation.

In the case of a filament, which does not fully surround an incandescent element, heat radiation is also emitted from the incandescent element directly to the inner side of the bulb. From this inner side, the heat radiation in turn is reflected on the filament.

Likewise, the heat radiation emitted from the filament is reflected from the inner side of the bulb, and thus contributes to the backheating of the filament. As a whole, the light source of the present invention could be described a radiation furnace lamp, wherein the bulb forms an internally heated radiation furnace for the infrared radiation.

The large, possible surface of the filament permits constructing light sources with high light outputs. It is likewise possible to adjust the color temperature of the light source independently of the surface temperature of the filament or incandescent element. This may occur by the spectrally selective mirror coating, which is capable of predetermining the transmitted spectral distribution of the radiation output emitted from the bulb and thus the color temperature.

In comparison with previous light sources of the same light output, it is possible to lower in particular the surface temperature of both the incandescent element and the filament, inasmuch as, on the one hand, the entire radiation output of the incandescent element must correspond only to the sum of the visible radiation output and the thermal dissipation power of the light source. However, same is smaller by the portion of

reflected and reabsorbed heat radiation or portion of the infrared radiation output than the total radiation output of comparable temperature radiators of the art. In accordance with the Stefan-Boltzmann law, the total
5 specific heat radiation is a function of the temperature, so that the incandescent element of the light source according to the invention can be operated at a lower temperature in comparison with the directly heated filament of comparable thermal light sources of the art.
10 On the other hand, likewise for comparison, the surface temperature of the filament may be adjusted lower, since the comparable visible light current can be generated by a larger and colder surface of the filament. In this connection, the filament surface forms a new, additional
15 constructional degree of freedom.

While it is possible to operate the filament at a relatively low temperature, and while with that also a relatively low evaporation of the filament material is reached, a disturbing evaporation may occur because of
20 the very large surface, which is as close as possible to the inner side of the bulb. As a result of filament material, which has evaporated and settled on the inner side of the bulb, the reflectivity of the inner side of the bulb or the mirror coating on the inner side of the
25 bulb is reduced, and the absorption of the bulb or the mirror coating and the thermal dissipation respectively are increased. It is therefore desirable to minimize the evaporation of the filament material to the greatest extent.

30 For minimizing the evaporation of the filament material, the bulb could contain an inert gas and/or a halogen gas, with the halogen gas containing bromine and/or iodine. With that, it would be possible to

generate a normal tungsten iodide circulation in the case of a tungsten filament.

An alternative solution to the evaporation problems could occur by coating the filament and/or the
5 incandescent element with a coating material, which has a higher melt point than the material of the filament and/or incandescent element. This lies in the dependency of the temperature-dependent vapor pressure of a solid from its melt point. Furthermore, the deposit of the
10 coating material could exhibit a lesser absorptivity than the deposit of the standard filament material or the material of the incandescent element. As a coating material with a very high melt point, it would be possible to use, for example, tantalum carbide, and/or
15 rhenium carbide, and or niobium carbide, and/or zirconium carbide.

As a result of the constructionally necessitated large filament surface, it is possible to generate very high light currents and to emit them from the light
20 source, so as to enable an illumination of large building interiors or outdoor areas with only one light source according to the invention.

There exist various possibilities of improving and further developing the teaching of the present invention
25 in an advantageous manner. To this end, one may refer on the one hand to the claims dependent from claim 1, on the other hand to the following detailed description of a preferred embodiment with reference to the drawing. In conjunction with the detailed description of the
30 preferred embodiment of the invention with reference to the drawing, also generally preferred improvements and further developments of the teaching are described. In the drawing:

Figure 1 is a perspective side view of the embodiment of a light source according to the invention; and

5 Figure 2 is a top view of the embodiment of Figure 1.

Figure 1 is a perspective side view of an embodiment of a light source according to the invention. The light source is designed and constructed as an incandescent lamp, which comprises a bulb 1 that accommodates a filament 2. For heating the filament 2, a heating device 3 is provided, which provides an electric current. The heated filament 2 emits both visible light and heat radiation. The temperature of the heated filament 2 can be about 3,000 degrees Celsius.

15 With respect to a high conversion efficiency and a reliable operation of the light source, the heating device 3 includes a heating element 4 for indirectly heating the filament 2. The heating element 4 is an incandescent element in spiral form, and may consist, for example, of tungsten. The filament 2 is realized substantially in the shape of a cylinder jacket, and therefore has a large absorption surface for a radiation of heat, which is reflected from the inner side of bulb 1. As a result, the filament 2 is effectively backheated by the reflected heat radiation. This makes it possible to select a lower temperature of the heating element 4 than would be necessary in the case of a conventional light source with the same light output. Consequently, it is possible to operate the light source of the present invention with lesser energy and thus more economically than conventional light sources.

25 The filament 2 in the form of a cylinder jacket is attached in a simple manner to a power supply conductor 5 for the heating element 4. The heating element 4 or

incandescent element in the form of a spiral is positioned in concentric and coaxial relationship with the filament 2. The filament 2 in turn is arranged in the bulb 1 in concentric and coaxial relationship with the quasi tubular bulb 1. The filament 2 having the shape of a cylinder jacket or tube is made from tungsten.

In the lower end of bulb 1, electrical contacts 6 are provided for supplying a current. The electrical contacts 6 are fused together with the lower end of bulb 1.

The diameter of filament 2 is only slightly smaller than the diameter of bulb 1.

The inner side of bulb 1 is provided with a mirror coating 7. The mirror coating 7 is used for an effective reflection of the heat radiation that is emitted from heating element 4 and/or filament 2.

The heating element 4 and/or the filament 2 could include a coating of a material with a very high melt point. This would allow to reduce an evaporation of filament material and/or heating element material.

Figure 2 is a top view of the embodiment of Figure 1. As best seen in this Figure, the filament 2 is arranged in bulb 1 in substantially concentric relationship, and the heating element 4 is positioned in filament 2 substantially in the center thereof.

As regards further advantageous improvements and further developments of the teaching in accordance with the invention, the general part of the description on the one hand and the attached claims on the other are herewith incorporated by reference.

Finally it should be expressly emphasized that the foregoing, merely arbitrarily selected embodiment is used only for explaining the teaching of the present

invention, without however limiting same to this
embodiment.

C L A I M S

1. Light source, in particular incandescent lamp,
with a bulb (1), a filament (2) arranged in the bulb (1),
5 and a heating device (3) for the filament (2), the
filament (2) emitting both visible light and heat
radiation,
characterized in that the heating device (3) includes a
heating element (4) for indirectly heating the filament
10 (2).

2. Light source of claim 1, characterized in that
the filament is constructed in the form of a strip or as
a surface filament.
15

3. Light source of claim 1, characterized in that
the filament (2) is constructed in the shape of a cup,
cylinder jacket, or as a volume filament.

20 4. Light source of claim 1, characterized in that
the filament is constructed as a cylinder jacket half.

5. Light source of claim 1, characterized in that
the filament (2) is constructed as an open, lengthwise
25 slotted cylinder jacket.

6. Light source of one of claims 3-5,
characterized in that the diameter of the cylinder jacket
or cylinder jacket half is only slightly smaller than the
30 diameter of the bulb (1).

7. Light source of one of claims 1-6,
characterized in that the filament (2) is arranged in the
bulb (1) in concentric relationship.

8. Light source of one of claims 1-7,
characterized in that the filament (2) is arranged in
coaxial relationship with a longitudinal axis of the bulb
5 (1).

9. Light source of one of claims 1-8,
characterized in that the filament (2) contains tungsten
and/or rhenium and/or tantalum and/or zirconium and/or
10 niobium, preferably in a sintered form.

10. Light source of one of claims 1-9,
characterized in that the filament is composed at least
in part of a nonmetal.
15

11. Light source of one of claims 1-10,
characterized in that the filament is composed at least
in part of tantalum carbide and/or rhenium carbide and/or
niobium carbide and/or zirconium carbide.
20

12. Light source of one of claims 1-11,
characterized in that the heating element (4) is an
incandescent element, which is heated by an electric
current.
25

13. Light source of claim 12, characterized in that
the incandescent element is a heating coil.

14. Light source of claim 12 or 13, characterized
30 in that the incandescent element is arranged within a
space or half space formed by the filament (2),
preferably within a cylinder jacket or a cylinder jacket
half.

15. Light source of claims 12-14, characterized in that the incandescent element is made from tungsten.

16. Light source of one of claims 1-15,
5 characterized in that the filament (2) is attached to a power supply conductor (5) for the heating element (4).

17. Light source of one of claims 1-16,
characterized in that for the indirect heating of the
10 filament magnetic inductors are arranged in the bulb.

18. Light source of one of claims 1-17,
characterized in that for the indirect heating of the
filament magnetic inductors are arranged outside of the
15 bulb.

19. Light source of one of claims 1-18,
characterized in that the bulb (1) includes a mirror
coating (7) on its inner side.

20

20. Light source of claim 19, characterized in that
the mirror coating (7) is formed by a dielectric
multilayer coating.

21. Light source of one of claims 1-20,
characterized in that an inert gas and/or a halogen gas
are present in the bulb (1).

22. Light source of claim 21, characterized in that
30 the halogen gas contains bromine and/or iodine.

23. Light source of one of claims 1-22,
characterized in that the filament (2) and/or the
incandescent element are coated with a coating material,

which has a higher melt point than the filament material and/or the material of the incandescent element.

24. Light source of claim 23, characterized in that
 5 the coating material contains tantalum carbide and/or
 rhenium carbide and/or niobium carbide and/or zirconium
 carbide.

ABSTRACT

A light source, in particular incandescent lamp,
with a bulb (1), and filament (2) arranged in the bulb
5 (1), and a heating device (3) for the filament (2), the
filament (2) emitting both visible light and heat
radiation, is designed and constructed with respect to a
high conversion efficiency between electric power and
visible light output such that the heating device (3)
10 includes a heating element (4) for the indirect heating
of the filament (2).

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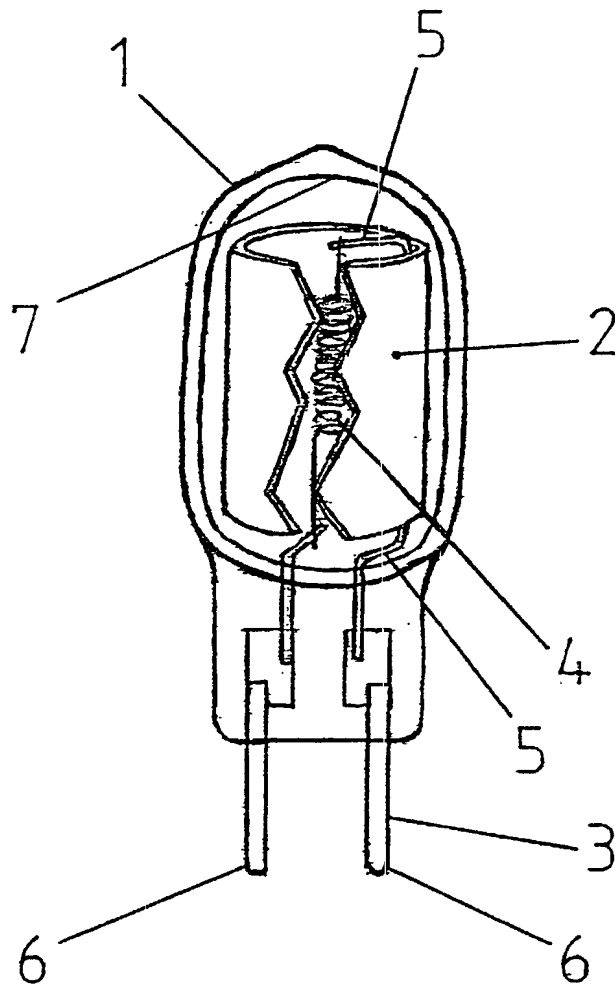


Fig. 1

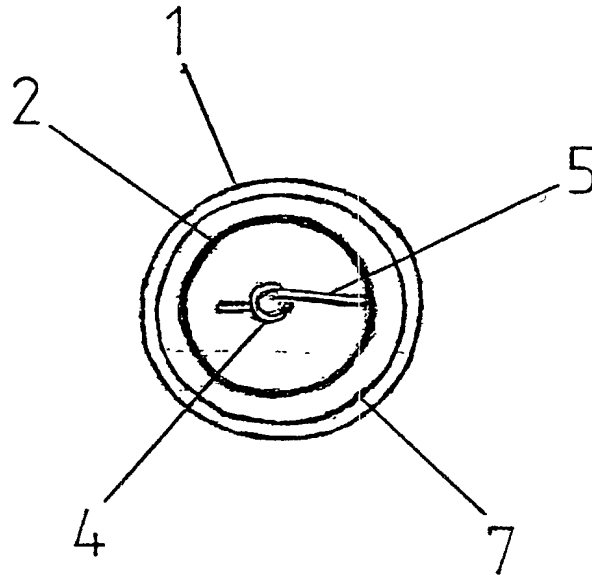


Fig. 2

Declaration and Power of Attorney for Patent Application**Erklärung für Patentanmeldungen mit Vollmacht****German Language Declaration**

Als nachstehend benannter Erfinder erkläre ich hiermit an Eides Statt:

daß mein Wohnsitz, meine Postanschrift und meine Staatsangehörigkeit den im nachstehenden nach meinem Namen aufgeführten Angaben entsprechen, daß ich nach bestem Wissen der ursprüngliche, erste und alleinige Erfinder (falls nachstehend nur ein Name angegeben ist) oder ein ursprünglicher, erster und Miterfinder (falls nachstehend mehrere Namen aufgeführt sind) des Gegenstandes bin, der hiermit beansprucht wird und für den ein Patent für die Erfindung mit folgender Bezeichnung begehrt wird:

deren Beschreibung hier beigelegt ist, es sei denn (in diesem Falle Zutreffendes bitte ankreuzen), diese Erfindung

- ☐ wurde angemeldet am _____ unter der US-Anmeldenummer oder unter der Internationalen Anmeldenummer im Rahmen des Vertrags über die Zusammenarbeit auf dem Gebiet des Patentwesens (PCT) _____ und am _____ abgeändert (falls zutreffend).

Ich bestätige hiermit, daß ich den Inhalt der oben angegebenen Beschreibung, einschließlich der Ansprüche, die eventuell durch eine oben erwähnte Änderung abgeändert wurde, durchgesehen und verstanden habe.

Ich erkenne meine Pflicht zur Offenbarung jeglicher Informationen an, die zur Prüfung der Patentfähigkeit in Einklang mit Titel 37, Code of Federal Regulations, § 1.56 von Belang sind.

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

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the specification of which is attached hereto unless the following box is checked:

- ☒ was filed on 24 March 2000 as United States Application Number or PCT International Application Number PCT/DE00/00911 and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56.

German Language Declaration

Ich beanspruche hiermit ausländische Prioritätsvorteile gemäß Title 35, US-Code, § 119(a)-(d), bzw. § 365(b) aller unten aufgeführten Auslandsanmeldungen für Patente oder Erfinderkunden, oder § 365(a) aller PCT internationalen Anmeldungen, welche wenigstens ein Land außer den Vereinigten Staaten von Amerika benennen, und habe nachstehend durch Ankreuzen sämtliche Auslandsanmeldungen für Patente bzw. Erfinderkunden oder PCT internationale Anmeldungen angegeben, deren Anmeldetag dem der Anmeldung, für welche Priorität beansprucht wird, vorangeht.

Prior Foreign Applications
(Frühere ausländische Anmeldungen)

<u>199 39 903.4</u>	<u>DE</u>
Number	(Country)
(Nummer)	(Land)
 <u>199 48 420.1</u>	 <u>DE</u>
Number	(Country)
(Nummer)	(Land)

Ich beanspruche hiermit Prioritätsvorteile unter Title 35, US-Code, § 119(e) aller US-Hilfsanmeldungen wie unten aufgezählt.

<u>(Application No.)</u>	<u>(Filing Date)</u>
(Aktenzeichen)	(Anmeldetag)
 <u>(Application No.)</u>	 <u>(Filing Date)</u>
(Aktenzeichen)	(Anmeldetag)

Ich beanspruche hiermit die mir unter Title 35, US-Code, § 120 zustehenden Vorteile aller unten aufgeführten US-Patentanmeldungen bzw. § 365(c) aller PCT internationalen Anmeldungen, welche die Vereinigten Staaten von Amerika benennen, und erkenne, insofern der Gegenstand eines jeden früheren Anspruchs dieser Patentanmeldung nicht in einer US-Patentanmeldung, bzw. PCT internationalen Anmeldung in einer gemäß dem ersten Absatz von Title 35, US-Code, § 112 vorgeschriebenen Art und Weise offenbart wurde, meine Pflicht zur Offenbarung jeglicher Informationen an, die zur Prüfung der Patentfähigkeit in Einklang mit Title 37, Code of Federal Regulations, § 1.56 von Belang sind und die im Zeitraum zwischen dem Anmeldetag der frühen Patentanmeldung und dem nationalen oder im Rahmen des Vertrags über die Zusammenarbeit auf dem Gebiet des Patentrewesens (PCT) gültigen internationalen Anmeldetags bekannt geworden sind.

<u>(Application No.)</u>	<u>(Filing Date)</u>
(Aktenzeichen)	(Anmeldetag)
 <u>(Application No.)</u>	 <u>(Filing Date)</u>
(Aktenzeichen)	(Anmeldetag)

Ich erkläre hiermit, daß alle in der vorliegenden Erklärung von mir gemachten Angaben nach bestem Wissen und Gewissen der Wahrheit entsprechen, und ferner daß ich diese eidesstattliche Erklärung in Kenntnis dessen ablege, daß wissentlich und vorsätzlich falsche Angaben oder dergleichen gemäß § 1001, Title 18 des US-Code strafbar sind und mit Geldstrafe und/oder Gefängnis bestraft werden können und daß derartige wissentlich und vorsätzlich falsche Angaben die Rechtswirksamkeit der vorliegenden Patentanmeldung oder eines aufgrund deren erteilten Patentes gefährden können.

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Priority Not Claimed
Priorität nicht beansprucht

22 August 1999 ☐
(Day/Month/Year Filed)
(Tag/Monat/Jahr der Anmeldung)

08 October 1999 ☐
(Day/Month/Year Filed)
(Tag/Monat/Jahr der Anmeldung)

I hereby claim the benefit under Title 35, United States Code, § 119(e) of any United States provisional application(s) listed below.

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s), or § 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

(Status) (patented, pending, abandoned)
(Status) (patentiert, schwebend, aufgegeben)

(Status) (patented, pending, abandoned)
(Status) (patentiert, schwebend, aufgegeben)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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VERTRETUNGSVOLLMACHT: Als benannter Erfinder beauftrage ich hiermit den (die) nachstehend aufgeführten Patentanwalt (Patentanwälte) und/oder Vertreter mit der Verfolgung der vorliegenden Patentanmeldung sowie mit der Abwicklung aller damit verbundenen Angelegenheiten vor dem US-Patent- und Markenamt: (Name(n) und Registrationsnummer(n) auflisten)

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) to prosecute this application and transact all business in the Patent and Trademark office connected therewith: (list name and registration number)

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Vor-und Zuname des einzigen oder ersten Erfinders 1-00		Full name of sole or first inventor	
Unterschrift des Erfinders		Inventor's signature	
Datum		Date	
Wohnsitz		Residence	
Staatsangehörigkeit		Citizenship	
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